# Relationship Between Crystallized and Fluid Intelligence and Success on The Night Out Task: A Measure of Everyday Functioning

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## Background

- The Night Out Task (NOT) was created to test everyday functional abilities in individuals by mimicking complex, open-ended situations people may experience in everyday life in the clinic
- Efficient and accurate assessment of an older adult's functional ability is necessary for evaluating and addressing safety concerns, informing clinical diagnoses and initiating appropriate intervention
- This study explores how crystallized and fluid intellectual abilities affect success on the NOT variables in a sample of older adults
- We hypothesized that fluid intelligence will be a stronger predictor than crystallized intelligence of NOT performance due to the novelty of the task

## Methods

***Participants***

- 47 older adults between the ages of 50 and 83 (*M age* = 63.72, *SD* = 8.22) who completed the NOT in a lab setting

***Procedure***

- Individuals were tasked with preparing for a night out, which required completing eight subtasks
- Participants were provided a detailed written list of the subtasks that needed to be completed for the night out (see Table 1)
- Participants were instructed to multi-task and interweave the tasks so that the tasks could be completed efficiently
- The recently completed digital NOT app was used to score their behavior

***NOT Scores***

- Total Time (in seconds): Total time to complete NOT
- Total Errors: Sum of all errors made on the NOT
- Accuracy Score: Each subtask receives a completion score (see Table 2), which are then summed. Prototype app shows a list of potential situations (errors) that would result in each of the eight subtasks being coded as inefficient, incomplete or inaccurate (see Figure 5)
- Sequencing Score: Summed number of six possible efficient sequences

**Table 1. NOT Tasks**

| Eight Tasks |
|---|
| Choose movie snack (rules) |
| Phone friend just prior to leaving |
| Locate recipe and gather ingredients |
| Plan movie trip |
| Bring bag to exit |
| Prepare tea (takes 3 min) |
| Get correct movie change |
| Pack travel bag |

**Table 2. NOT Completion Scores**

| Completion Scores for each Subtask |
|---|
| 1 = Completed Efficiently: no errors. |
| 2 = Complete Inefficiently: ≥ 1 inefficient error |
| 3 = Incomplete/Inaccurate: ≥ 1 error causing subtask to be completed inaccurately |
| 4 = Not Attempted |

**Questionnaires**

- Participants also completed neuropsychological tests from the NIH toolbox that assessed:
  - Crystallized Intelligence : Knowledge acquired throughout life
  - Fluid Intelligence : Ability to solve novel problems
  - Scores were reported as standardized scores that accounted for age and education

## Results

- Regression analyses were completed to determine whether crystallized and fluid intelligence predicted NOT task performances
- As seen in Table 3, a significant regression equation was found for total errors, with crystallized intelligence emerging as a significant predictor ($p$<.05)
- A significant regression equation was also found for total time, with fluid intelligence emerging as a significant predictor (p<.005)
- The regression model did not yield significant predictors for the sequencing or accuracy scores

Figure 1. Example NOT testing room

Figure 2. Recipe, Snack and Tea Items in Cupboard A

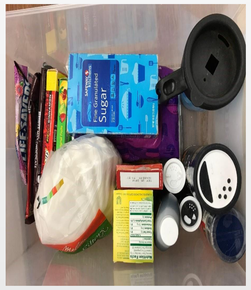

Figure 3. Recipe book and items in Cupboard B

Figure 4. Movie Schedule and Change

Figure 5. NOT tablet coding Application

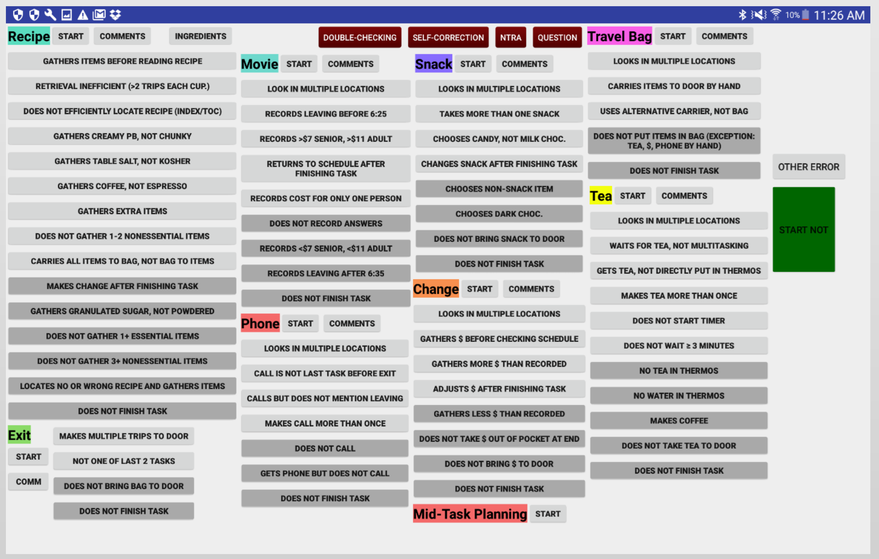


**Table 3. *Summary of Regression Analysis of NOT variables***

| | NOT Total Time | NOT Total Errors | NOT Accuracy Score | NOT Sequencing Score |
|---|---|---|---|---|
| Crystallized Intelligence | -.113 | -.315* | -.257 | .030 |
| Fluid Intelligence | -.419** | -.264 | -.185 | .031 |
| $R^2$ | .195 | .182 | .105 | .002 |
| F for $R^2$ | 5.699** | 4.663* | 2.533 | .042 |

Note: Standardized Beta Coefficients reported for predictors.
* Indicates $p$ <.05 and ** Indicates $p$ <.01

## Conclusions & Future Implications

- In a sample of healthy older adults, crystallized intelligence was a significant predictor of NOT total errors and fluid Intelligence of NOT total time
- The findings may suggest that knowledge gained through experience may be important for completing the task components without making errors
- Concomitantly, fluid intelligence, which declines with age and is important for novel problem-solving, may be important for quick and efficient task execution
- These suppositions will require further exploration
- This project may have been limited by the small sample size of participants and the homogeneity of intelligence scores of the participants
- Moving forward, we would like to validate the NOT as a clinic-based measure of everyday functioning

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